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ABSTRACT

Change is more advantageous if it incorporates an entire society rather than an element of that society, and the goals of educational development will be most fruitfully realized with a minimum of harmful effects if programs of instructional development are made to focus on the entire culture, rather than on a single social institution. A systems approach may be extremely important to the educational planner as it emphasizes the need for an integrated approach, recognizing that several factors must be considered together if sound goals are to be met by sound programs. The systems theory paradigm also offers a conceptual tool to the planner whereby a process may be organized into categories, and in so doing may lead to the generation of research, prediction of outcomes, and the encouragement of measurement and evaluation. (CMV)

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Educational Technology in the Third World:

A General Systems Perspective

#9

Njoku Awa, Jack Barwind and R. Arnold Gibbons

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Foreword

Because education is often seen as a passport to a better life--by individuals and by nations--much emphasis is evident around the world of "leapfrogging" into sophisticated technology to expand and speed up the educational process. Without arguing against the value of education, we have begun to see some uneasiness over some of the policies that have accompanied the introduction of technology for "educational reform." For example, the question is being raised as to whether the "big media" (television, films and computer assisted instruction) are superior enough to the "little media" (radio, audio tape recordings, programmed instruction, and simple visuals) to warrant their substantial incremental costs.

This paper raises another issue concerning technology in education. Its authors question the wisdom of approaches that focus solely on a country's educational system. "It is dangerous," they say, "to commit a society to technology before the problems which will inevitably accompany such technology are analyzed, projected and studied. Yet," they contend, "There is much evidence that this is being done in developing countries of Africa, Asia and Latin America."

They offer no easy solutions, but appeal for an approach that introduces technology with some "cultural perspective."

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R.D.C.

Introduction

The use of instructional technology is growing in acceptance. Professor Ronald F.G. Campbell offered the following definition of instructional development: ". . . the systematic attack on a teaching-learning problem using the whole complex of acquired theoretical knowledge together with the production skills available today."[1] Campbell goes on to specify particular aspects of his definition:

> The theoretical knowledge involved consists of the findings of human learning theory, communication theory, and the results of investigation in the area of tests and measurements. The production skills mentioned refer to the growing experience of personnel in the fields of audio visual aids, television, computer-assisted instruction and independent study carrels.[2]

A system of instructional development should maximize learning in the most efficient manner possible. This very justification has stood behind many educational innovations. Economic factors also became a strong consideration in any instructional development programs. For example, educational planning is generally based on three strong economic factors: (1) general allocation of resources within a nation's or system's overall budgetary constraints; (2) specific budgetary allocations within a given education budget; and (3) educational evaluation of various instructional techniques. Many have viewed educational technology as a means of maximizing learning in the most efficient manner with the lowest cost.

The communication industry has increasingly developed newer methods of information dissemination. RCA and CBS have developed means of providing low-cost video cassettes and discs to educational institutions. Aerospace technology is providing means of transmitting information over wide geographic areas, via communication satellites. Efficient teaching

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[1] R.F.G. Campbell "Terminal Program Report for the Finger Lakes Faculty Development Institute" (Conducted by the Department of Communication Arts and the Instructional Resources Center of Ithaca College in cooperation with the U.S. Office of Education (Title VI-B), 1969).

[2] Ibid., p. 1.

machines suited to programmed learning have been developed. Computer-based instructional systems are being rapidly expanded by the electronics industry.

The theoretical potential of the various technologies, instructional television and radio,[3] programmed learning,[4] teaching machines,[5] computer-based instruction,[6] and communication satellites,[7] have been discussed elsewhere in great detail. Such discussions usually emphasize the potential of modern technology as a tool for educating large numbers of people with optimal efficiency.

The application of this technology to developing nations has become an increasing reality.[8] Its most efficient use involves the interaction with teachers, facilities, and curricula. Such use of the technology, coupled with sound theoretical formulations, offers great potential for educational development in Third World nations. However, this does not imply the carte blanche use of educational technology for its own sake. Educators

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[3]G.J. Davis, "The Challenge of Educational Technology in Under-developed Countries," Audio-Visual Instructional Journal (Association for Educational Communications Technology), 15, (1970), pp. 64-67.

[4]M.J. Barwind and J. Barwind, "The Comparative Effects of Programmed Instruction and Central Lecture Techniques in an Introductory College Course," Mimeograph (Graduate Teaching and Research Center, Cornell University, 1970); and W.G. Garner, Programmed Instruction (New York: Center for Applied Research in Education, 1966).

[5]B. Fine, Teaching Machines (New York: Sterling Publisher Company, 1962); E. Galanter (ed.), Automatic Teaching: The State of the Art (New York: John Wiley & Sons, Ing., 1959); and W.C. Trow, Teacher and Technology (New York: Appleton-Century-Crofts, 1963).

[6]J.E. Coulson (ed.), Programmed Learning and Computer-Based Instruction: Proceedings of the Conference on Application of Digital Computers to Automated Instruction (New York: John Wiley & Sons, 1962); and J. Goodlad, J. O'Toole, and L. Typer, Computers and Information Systems in Education (New York: Harcourt, Brace and World, 1966).

[7]R. Colle, "The Indian Satellite Experiment: What Next?" Presented to the VII General Assembly of the International Association for Mass Communications Research, Constance, West Germany, September 1-4, 1970; and M. Cusack, "New Media in Africa: Trends and Strategies," Educational Broadcasting Review, 4, (1970).

[8]W. Schramm, P. Coombs, F. Kahnert, and J. Lyle, New Educational Media in Action: Case Studies for Planners (2, Paris: UNESCO, IIEP, 1967).

need to go beyond considerations of efficiency and economy to considerations of a culture's ability to cope with new technology.

The Communication Process

A discussion of instructional development implies a discussion of the process of communication. Instructional development and communication, at both theoretical and technological levels, have complementary aspects. Each inherently involves the production, dissemination, and reception of information.

A recent UNESCO report of the meeting for consultants in Mass Communication Research[9] suggested three dimensions for communication research. These dimensions were: (1) communication process, (2) channels of communication, and (3) interdisciplinary viewpoint.

The first dimension, process of communication, is extremely complex, involving the interaction of many variables. As written elsewhere,[10] communication may be thought of as existing within cultural, spatial, and temporal dimensions which operate in such a way as to shape the entire process. Within the dimensions of culture, space and time exist parallel dimensions of production, dissemination, and reception of information. This was diagrammed along with contributing variables in the UNESCO report and is presented in Table 1.

Table 1. Production, Dissemination, and Reception of Information

Production Process	Dissemination Process	Reception Process
Communicators	Transmission	Reception
Messages	Propagation	Decoding
Encoding	Distribution	Perception
Production, etc.	Diffusion, etc.	Cognition
		Learning
		Attitude Response
		Behavior
		Action
		Social Effects

[9] UNESCO, Report of the Meeting of Consultants on the Compilation of Research Findings, (Paris, April 6-9, 1970).

[10] Jack A. Barwind (ed.), Guide to Effective Oral Communication, (Department of Communication Arts, Graduate Teaching and Research Center, Cornell University, 1970).

The second dimension, channels of communication, involves the various physical means of transmitting information. The concentration is thus on the media and data transmission systems. Central to any analysis of channels is a consideration of face-to-face communication, print media, broadcast media, and visual communication. Each of the above areas has a direct imput or relationship with the previous discussion of educational technology.

The final dimension of communication research concerns the interdisciplinary viewpoint involved. Communication is by nature multidisciplinary since nearly any academic discipline or study eventually adds information to the conceptual boundaries of the field of communication. Often identified as central to communication concerns are: Information Theory and Cybernetics, Systems Analysis, Economics, Law, History, Political Science, Sociology, Psychology, Anthropology, Linguistics, Rhetoric, Speech, Management and Organized Theory.

Both the study of human communication and communication technology and the study of education and educational technology are inherently multidisciplinary. The available literature easily attests to their wide diversity of disciplinary interests. Similarly, both these general areas of study find their commonality in the socio-psychological investigations of the effectiveness of methods used to disseminate information and to influence the receivers of such messages. That is, the two studies - communication and education - find common ground in the study and investigation of human communication processes. In this sense, education and communication may be seen as inherently "interdisciplinary" in the significant overlap of their individual multidisciplinary scopes.

The problem of educating vast populations is typically frustrated by two factors: (1) advancing public attention is cancelled out by population growth, and (2) the developing country's relative position in the world is worsened by the constantly accelerating growth of technology abroad. Often these factors are compounded by lack of an educational system that can realistically cope with the problems.

As stated earlier, communication technology offers man the potential of efficiently and economically disseminating a maximum amount of information. For example, several African nations such as the Ivory Coast,

Nigeria, Kenya, Niger, Algeria, and Togo have all attempted to use communication technology (ETC, ITV, Radio, etc.) to improve their educational systems. In many cases, this technology was used in teacher training programs, direct classroom instruction, and adult and extra-mural education.

If mass education is seen as a major means of enabling a developing country to take its place as an advanced country, the potential of mass communication must be seen as most important; traditional methods probably could not get the job done. Despite the plausibility of this view, successful introduction of mass communication or educational technology calls for a patient diagnosis of a given system's needs as well as an analysis of the actual and probable impact of the innovation on its norms, beliefs, and values.

The purpose of this paper is to suggest a rationale for instructional development in the Third World based on General Systems Theory. A further purpose is to underscore the complexity of the human problems involved in cross-cultural transfer of technology. Case studies focusing on the anatomy of "innovations which failed" have clearly shown that human, political and socio-cultural influences affect the outcome of ideas that cross cultural frontiers. While this is not a case study, it attempts to analyze the utility of technology under certain conditions and its futility under others.

Communication Technology and the Third World

It is customary to speak about a revolution in communication technology without saying what is meant by either communication or technology. The former is fashionable and like any fashion it must run its course until another succeeds it; the latter is in the throes of a revolution which will run its own course. We more or less assume that there is nothing to be done about technology; hence we take for granted developments which in the nature of things we come to accept with the casualness with which we accept the telephone.

We also take for granted the expansion of modern communication technology the world over. Implicit is the belief that because communication technology is found attractive inside our own borders where we use, misuse, praise, blame, exploit and neglect it, that the rest of

the world will do the same. In our haste towards "progress" (some would argue for its own sake), we have come to believe that the rest of the world, and in particular, the Third World countries, should emulate our approach to the entire paraphernalia of communication technology. The rationale being that they who are indeed true children of the twentieth century should be logical inheritors of its tools. And certainly no one can dispute that the pressures that operate on developing countries -- what with problems of nation-building, chronic instability, economic dependency, education, umemployment, industrial expansion, etc. -- can propel them to utilize the swiftest means available to solve their problems.

It is not our aim to cavil at the use of technology as a means towards a desirable end; but what concerns us is that in the haste towards a desirable end little time has been taken to investigate the most efficient and beneficial means to bring about change. Many of the benefits that can come from the use of technology can be lost or wasted because of inadequate planning. Not only is this true in the case of cost-benefit analysis, but also it is true in the most important sector, human development. People are simply not deriving the full benefit from the proliferation of the media about them, and almost before they can accustom themselves to change which comes in the wake of the machine, new apparatus replaces the old and the entire cycle of adaptation begins anew. This has been graphically spelled out and popularized by Alvin Toffler in Future Shock. Toffler's sphere of reference is the rich industrial nations of the West and presumably the East (since technology is an off-shoot of the industrial process and adheres to no political boundaries).

Because Third World nations are trying to bridge that all-important gap between poverty and technological development, the temptation to utilize the quickest means of survival may seem irresistible. That these nations can have a variety of "experts" at their disposal from a variety of agencies can only substantiate, if not fortify, their own inclination to modernize fast through the help of technology.

Technology is in many ways synonymous with modernity; and to be modern is to admit the need to change. At this stage the question must be asked whether developing countries are prepared for change and more especially, what kind of change they are psychologically and economically prepared to undergo? Change is more advantageous if it incorporates an entire society rather than an element of that society. What is involved

here is a society's balance: the distribution of wealth between the urban and country dwellers, the blue collar and the white collar workers, the privileged and the underprivileged, those who are able to afford the trappings of technology and those who are unable; as well as the political imbalance created by those able to absorb the fruits of technology.

These elements of change and what they portend for the future need to be examined. There is at present very little record of this examination since change tends to be taken for granted. Often we look on the dislocation of society as something inevitable and therefore accustom ourselves to the new circumstances, allowing time to be the healer of whatever wounds change may bring. While Western capitalist societies can afford the luxury of indiscriminate technological change because of their resources and trained manpower, Third World countries can hardly afford it. Even if they could, it is still questionable whether it would be in their best interest to do so. This, unfortunately, is not realized and damage done (these societies) cannot be estimated. For, how is it possible to estimate in quantitative terms the actual or potential violence that technology can do to a society's culture, or to its most important sector human development? It is dangerous to commit a society to technology before the problems which will inevitably accompany such technology are analyzed, projected and studied. Yet, there is not much evidence that this is being done in the developing countries of Africa, Asia, and Latin America.

Some well-documented reports of the efficacy of instructional television appear in the pages of UNESCO bulletins (e.g. UNESCO reports on Niger, and the Ivory Coast). Schramm has reported a field study of the Samoan experiment; and the efforts of local authorities to reach outlying areas by radio in Kenya, Uganda, and Zambia have also been considered and diverse attempts at developing instructional courses have been made by independent authorities such as Telestar in Zaire, the Duetsche Welle in Ruanda and Cen-pro in Colombia. Much of this sort of work though well-intentioned, suffers from a lack of a philosophical approach to media with the result that traditional educational concepts and methods are being used in situations demanding new and fresh strategies.

What is needed is an educational rationale and plan designed to meet the needs of the society, that is a plan which takes stock of a society's

social and cultural background and is capable of containing rather than be contained by technology. Furthermore, such a plan should consider individual welfare as the essential ingredient of constructive social change rather than an agent to be manipulated by technology. Theory must come before practice in the race to change people's habits and attitudes. The fear that technology can be used to influence, if not control, others has been expressed in several quarters. But the question remains: Who will bear the responsibility for human relations? The behavioral scientist as well as the politician must share in that responsibility. In the final analysis, it is humanity, not technology, that will bear the responsibility for human relations.

Lest we be misunderstood we are not saying that technology is an inherent evil which must be checked before the mechanical craw of the computer strips man of his humanity. On the contrary, we see technology as a tremendous tool, like that of the plow, which when controlled through planned usage can lead people to increased per capita incomes and better living levels through modernization and improved social organization. We do not see ourselves as missionaries or evangelists of technology and social change, imposing on a culture our perception of proper levels of living and social organization. Such a philosophy is in our estimation a mistake; a mistake which is both tactical and moral. When the United States was relatively inexperienced in extending aid to developing countries, it appears to have been commonplace to assume the inherent worth of American culture and that all that had to be done to be successful was to teach persons in a host country how to emulate America's technological prowess. That assumption may be seen as too paternalistic. The error of such thinking and the promise of having learned from our collective experience was pointed out by E.E. Hagen, Acting Director of M.I.T.'s Center for International Studies in a recent report.

> We have learned during the past two decades that the changes in low-income countries leading to continuing economic growth are slow and gradual. We have learned also that to a greater extent than we had realized they must be self-generating, even though foreign capital assistance and technical advice provide invaluable aid....We have also learned that rising income does not itself solve the problem of frustrations: that the social, economic, and political relationships among men and groups are far more important for social stability than absolute levels of income.[11]

A task force on International Development Assistance in surveying the United States programs which have been undertaken in recent years, evolved much the same ideal while yet holding tightly to a unitary purpose in the United States commitment to developing countries.

> Our commitment as a nation should be a willingness to assist disadvantaged peoples who seek help in their desire to improve their lives....America has no mandate to shape the world in its own image, but we do have an obligation to contribute to its betterment.[12]

There is a question in our minds whether any nation and/or agency has the right to "intervene" in a culture. This must be tempered, however, with the realization that any nation has the right to improve its lot in the direction it chooses even if that direction was given impetus by past intervention programs. For example, consider the Third World countries of Africa who via contact with colonial powers have changed from typical tribal cultures to quasi-industrial countries. In the process these countries have been given an appetite for what is assumed to be positive attributes of the colonizers. Knowledge of the relative wealth and living conditions of the French has led the leaders of the Ivory Coast to desire these conditions for their own people. This is not to assume that the Ivory Coast wishes to emulate the entire French culture, rather the desire has been created to emulate or develop these "positive" factors which have somehow been perceived as valuable. An educated populace is often perceived as one of these "positive" factors. Traditional educational structures and techniques make the desired goal temporarily unfeasible. Thus, in search of efficient means of obtaining an educated populace a country turns to technology.

Technology is often seen by the leadership of a developing nation as a panacea for national woes and as an avenue which will allow the nation to compete with and stand by its more developed neighbors. This goal to develop is quite natural and justified as is the realization that

[11]Massachusetts Institute of Technology, Research Report (Cambridge, Mass.: Center for International Studies, April, 1970), p. 3.

[12]"International Development Assistance," report of the Task Force on International Development Assistance and International Education convened by the National Association of State Universities and Land-Grand Colleges (January, 1969), p. 3.

technology can be an important aid in reaching the desired end. While technology is necessary to modernization and modernization is necessary to develop, the carte blanche adoption of technology for technology's sake can destroy rather than build the developing society. The introduction of technology increases the rate of change within any society and in so doing fosters change within the traditional structures and institutions of that society. Corroboration for this point is easily made if one thinks of the vast changes in the social institutions of Western cultures since the advent of the automobile.

What is implied here is not to withhold technology from Third World nations for to do so would be to deny them the right to take their place along side their wealthier neighbors. Rather our intent is to suggest a theoretical base, a rationale, for introducing change via technology while at the same time allowing the nation to determine its own course and its own strategy for preparing its people to cope with a changing environment.

While the focus of this work is on the Third World, we feel our suggestions are sufficiently broad as to lead to generalizations concerning the gamut of human resource development. Our focus is on the human as opposed to the technological variables within a national system.

A Rationale for Instructional Development in Third World Countries

It is our belief that the goals of educational development will be most fruitfully realized with a minimum of deleterious effects if programs of instructional development are made to focus on the entire culture rather than on a single social institution. We question the wisdom of programs of instructional development that focus solely on a given country's educational institution. Such an approach will lead to its own stagnation. We assume that the larger view must be maintained; thus, we suggest a general systems orientation to instructional development.

A system is considered to be a boundary maintaining entity of interrelated parts, that is to say a system is a self-contained unit (comprised of other self contained units--subsystems) that operate both independent of and dependent on its greater environment.

The systems rationale may be extremely important to the educational planner in that it emphasizes the need for an integrated approach, recognizing that several factors must be considered together, if "sound"

goals are to be met by "sound"programs. In addition, the systems theory paradigm (IMPUT-PROCESS-OUTPUT) offers a conceptual tool to the planner whereby a process may be organized into categories, and in so doing may lead to the generation of research, prediction of outcomes, and the encouragement of measurement and evaluation.

Much of our rationale for instructional development in developing nations has been derived from systems theory. We assume a systems orientation in that change in one aspect of a system leads to change in other aspects of that same system. Change at the individual level will lead to change at the societal level. Further, we assume that change produces a state of disequilibrium which, in turn, results in pressures to reduce imbalance and to gain what has been termed a state of dynamic equilibrium. Because of this change/equilibrium notion we believe that instructional development in Third World countries must focus on the WHOLE (culture) when considering a given part (education). We see instructional development as an educational strategy which implies a multifaceted approach designed to alter or modify the attitudes, values, beliefs, and structures of both individual and social systems. It is thereby a means leading to social change.

To think of instructional development in this manner leads to an educational strategy which is designed to the needs and values of the individual. Further, this orientation necessitates a concern for both micro-and macro-system variables. It becomes essential that the educational strategy be in concert with the larger society.

It is not our purpose in this paper to present specific examples for the introduction of instructional development. Rather, we have been concerned with the general need in developing countries to utilize a cultural perspective in implementing programs of instructional development.